

M.Tech I.T Syllabus

SOFTWARE ENGINEERING (MT- 103)

PART –A

Introduction: Software Crisis, Software myths, Definition of software Engineering.
Software life cycle models: - Quick and fix model, Waterfall model, Prototyping, iterative Development. Spiral model, V Model Characteristic of a software process, ISO 9000.

Software requirement analysis and specification:-Software Requirement problem analysis, requirement Specification, Requirement validation planning a Software project Cost Estimation, Project planning , Project scheduling ,Project staffing, risk management.

Software Design :-Software Design ,Data Design, Architectural Design ,Software Design Notations- Flow charts, Data flow Diagrams , Structure charts .

PART-B

Coding: - Features of software code Programming Practice- Top down Programming, Bottom –Up Programming Structured Programming, Information hiding.

Testing: - Fundamentals, Software Testing Strategies, Level of Software Testing, Testing Techniques, Debugging.

Software Maintenance: - What is Software Maintenance, Types of Software Maintenance, Software Maintenance Life cycle, Reverse Engineering and Re-engineering, Documentation.

TEXT BOOKS:

1. Pankaj Jalote
2. K.K. Aggerwal 'Software Engineering'

COMPUTER NETWORK (MT-104)

PART-A

Introduction:-Definition uses, Application, Network Hardware, Network Software, The O.S.I. Reference model.

Physical Layer: - Transmission Media –Magnetic Media , Twisted pair ,Coaxial-Cable ,Fiber optics , Wireless Transmission - Radio Transmission, Microwave transmission, Infrared and Millimeter Waves, Light -wave Transmission.

ATM, Communication Satellite: - Geosynchronous Satellite, Low-orbit Satellites Vs Fiber.

Data Link Layer: - Design Issues-Service Provided to Network Layer, Framming, Error Control, and Flow control, Error Detecting Code, Error Correcting Codes, Simple Stop and Wait Protocol, Sliding Window Protocol, A Protocol Using Go Back n, Selective Repeat Protocol.

PART-B

Medium Access Layer :- IEEE Standard 802 for LAN's and MAN's -IEEE Standard 802.3 and Ethernet , IEEE Standard 802.4: Token Bus, IEEE Standard 802.6 : Distributed Queue Dual Bus , High Speed LANS- FDDI, Fast Ethernet , Satellite Network Polling , FDM, TDM , CDMA .

Network Layer- Design Issues, Routing Algorithms- Shortest Path Routing, Flooding, Broadcast Routing, Congestion Prevention Policies, Traffic Shapping, Jitter Control.

Transport Layer: - Design Issues, Connection Management –Addressing, Establishing a Connection, Releasing a Connection, Crash Recovery.

Application Layer: - Network Security- Cryptography, Authentication, Digital Signature, Multimedia, Video.

OPERATING SYSTEM (MT-102)

PART A

Introduction: Definition of Operating System, Function of an Operating System, Different Types of Systems-Simple Batch System, Multi-Programmed batched System, Time Sharing system, Personal Computer System, Parallel Systems, Distributed Systems.

Process Management: Process-Process Concept, Process Scheduling, operation On processes, Threads, CPU scheduling-scheduling Criteria, Scheduling Algorithms-FCFS, SJF, priority Scheduling, multilevel queue scheduling, multilevel feedback queue scheduling, multiple processor scheduling, real time scheduling.

Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, deadlock Prevention, Deadlock Avoidance, Deadlock detection, Recovery from Deadlock

PART –B

File System interface: File Concept, Access Methods-sequential, direct, index, directory structure-simple level, two-level, tree structured, acyclic graph, general graph.

File system Implementation; file System Structure, Allocation Methods-contiguous allocation, linked allocation, index allocation and Free Space management – bit vector, linked list, grouping, counting, directory implementation-linear list and hash table

Security: problem, authentication-passwords, program threats, system threats-worms, viruses threat monitoring, encryption.

Text:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne” Operating System Concepts “

COMPUTER GRAPHICS (MT-101)

PART-A

Introduction: Definition of Computer graphics and its Applications, Video Display Devices- Raster Scan Displays, Colour CRT Monitors, Direct View Storage Tubes, Flat Panel Display
Input devices: Keyboard ,mouse, Trackball ,Space ball, Joysticks ,Digitizers, Image Scanners, Touch Panels, Light Pens, Voice Systems.

Output Primitives: Line Drawing Algorithms DDA, Bresenham's Circle generating Algorithm; Midpoint Circle Drawing Algorithm, Ellipse Generating Algorithm, Midpoint Ellipse Generating Algorithm, Character generation, 2D Transformations: Translation, Rotation, Scaling, Refraction, Shear Composite Transformation-Translation, Rotations, Scaling.

PART-B

Two Dimensional Viewing: Window –To-Viewport Coordinate Transformation, Clipping Operations, Point Clipping, Line clipping-(Cohen-Sutherland-Hodgeman Polygon Clipping, Nicholl-Lee-Nicholl Line Clipping, Curve Clipping, Text Clipping

Three Dimensional Concepts: three Dimensional Display Methods-Parallel projections, Perspective Projection, Surface Rendering

Three Dimensional Transformations; Translation, Rotation, Scaling, Refraction, Shear.

Visible –Surface Detection Methods: Back face detection, Depth Buffer Method, A-Buffer method, Scan line method, depth Sorting Method

TEXT:

1. Donald Hearn & M.Pauline Baker, "Computer Graphics" Prentice Hall India

DATA STRUCTURES (MT-201)

PART-A

Preliminaries: Concepts & notation, common operation on data structures, algorithm complexity, time-space tradeoff between algorithms, physical logical representations of different data structures.

Arrays: Arrays defined, representing arrays in memory, various operation (traversal, insertion and deletion), multidimensional arrays and sequential allocation, Address calculation, sparse arrays.

List: Simple array Implementation of Lists, Linked Lists, Doubly Linked Lists, Circularly Linked List.

Stack: Stack Model, Implementation of Stacks, Application of Stacks.

Queue: Queue Model, Array Implementation of Queues, Application of Queues.

Trees: Implementation of Trees, Tree traversal with an Application, Binary Trees Implementation, expression Trees, Binary Search trees, Operations on BST, AVL Trees- Single Rotation, Double Rotation, B-Trees.

PART-B

Sorting: Insertion sort-Algorithm, Analysis of Insertion Sort, Shell Sort, Analysis of Shell Sort, Merge Sort- Analysis of Merge Sort, Quick Sort, Bucket Sort

Graphs: Definitions, Representation of Graphs, Topological Sort, Shortest –path algorithms- Unweighted Shortest paths, acyclic Graphs, directed graphs, Biconnectivity

TEXT:

1. Mullis Cooper: Spirit of C: Jacob Publications
2. Jean Paul Tremblay & Paul G. Sorenson: An Introduction to Data structures with applications, Tata McGraw Hill

OBJECT ORIENTED PROGRAMMING WITH JAVA (MT-204)

PART-A

Introduction To object Oriented Programming: Data abstraction, Encapsulation, Inheritance, Polymorphism, Information Hiding

Java Elements: Types, Literals and Variables, Operators- arithmetic, Bit-wise, Relational, Boolean Logical, Assignment, The '?' Operator, Operator Precedence, Control statements- Selection (if, switch), Iteration statements (while, Do-while, for), Jump Statements (break, Continue, return), Arrays (One dimensional, Multi-dimensional).

Introduction Classes: Classes fundamentals, Declaring Objects, Methods, Constructors, 'This' Keyword, Overloading Methods.

Inheritance: Inheritance Basics, Protected Members, Multiple Inheritance, Template Classes and Functions.

PART-B

Exception Handling: fundamentals, Exception types, uncaught Exceptions, Try and Catch, Dealing with Exceptions (try, throw, finally)

Java Applets: Applet Basics, The Applet Class, applet architecture, an Applet Skelton, applet display Methods, Handling Events.

Advanced Java Programming: Multithreading-Java thread Model, the Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities, Inter-thread Communication, Multithreading

Abstract Window toolkit: Working With windows, Graphics and text –The AWT Classes, Window Fundamentals, Working with frames Windows, Working with Graphics- Drawing Lines, Drawing ellipse, Drawing Rectangle, Drawing polygon, working with Color, Working with fonts.

TEXT:

1. Patrick Naughten & Herbert Schildt, "The Complete Reference Java ." Tata McGraw Hill.

COMPUTER ORGANISATION

PART A

Digital Logic Circuits and Components: Digital Computers - Logic gates - Boolean Algebra - Map Simplifications Combinational Circuits: Half-Adder, Full-Adder, decoders, Encoders, Multiplexers

Sequential Circuits: Flip flops, Registers, Shift Registers, Binary Counters - Memory Unit.
Data Representation :Data Types - Complements - Fixed Point Representation - Floating Point Representation - Other Binary Codes - Error detection Codes

Processor Organization: General Register Organization - ALU - Instruction codes - Instruction Formats – Stack Organization - Addressing modes

PART B

Control Unit: Register transfer and micro operations, Timing and Control, Control Memory, Microprogramming, Hard wired control

8085 Microprocessor: Internal Architecture, Instruction Set, Assembly Language programming

Input/output Organisation: I/O interface, Asynchronous data transfer, Modes of transfer, priority Interrupt, Direct memory access.

Memory Organization:-Memory Hierarchy, Main memory, Auxiliary memory, Associate Memory, Cache Memory, and Virtual memory.

Text Book:

- 1). Computer System Architecture , M. Morris Mano, Prentice Hall of India Pvt. Ltd., Eastern Economy Edition, Third Edition, Sept. 2002
- 2). Micro processor Architecture, Programming & Applications with the 8085, Ramesh S Goankar, Penram International Publishing(India) Pvt. Ltd., Fourth Edition, 2002

DATABASE MANAGEMENT SYSTEMS (MT-203)

PART A

Introduction: Data storing data in DBMS, Relational model, Levels of Abstraction, Data Independence, Queries DBMS, Transaction Management, structure of DBMS and people who work with DBMS

ER Model, Relational Model and Relational algebra: ER model, entities, attributes & entity sets; relationship & relationship sets, ER diagrams, key and participation constraints, weak entities, class hierarchies, aggregation, conceptual design with ER model, case study: requirement analysis and conceptual design, Relational algebra, relational calculus

SQL: Basic SQL query, nested queries, aggregate operators, null values, integrity constraints, Triggers

PART B

Database Design: Schema refinement, Functional dependencies, closure of set of FDs and attribute, Third & Boyce-code normal forms, properties of decomposition, Decomposition into 3NF and BCNF, Schema refinement in database design

Transaction Processing: ACID properties, Transaction & schedule, Concurrent execution of transaction, Lock-based concurrency control, crash recovery, Serializability and recoverability, Lock management, lock conversions, dealing with Deadlocks, Optimistic concurrency control, timestamp-based concurrency, Multiversion concurrency control, ARIES, logs, the write-ahead log protocol, check pointing, recovering from a system crash, media recovery

Text Book:

1. Database Management Systems; Raghu Ramakrishnan, Johannes Gehrke 4th Edition, McGraw-Hill

Reference:

1. Database System Concepts; A. Silberschatz, H. Korth 5th Edition, McGraw-Hill

NETWORK SECURITY AND CRYPTOGRAPHY

PART A

Introduction: Confidentiality -- Data Integrity -- Authentication -- Non-Repudiation: Overview of Issues involved.

Classical Encryption Techniques: Monoalphabetic, Substitution Methods, Polyalphabetic Substitution Methods - Permutation Methods -- Cryptanalysis of these Methods.

Modern Encryption Techniques: Simplified DES -- DES -- Triple DES -- Block Cipher, Design Principles -- Block Cipher Modes of Operation. IDEA -- Security Issues Involved with these methods.

Confidentiality Using Conventional Encryption: Placement of Encryption -- Traffic Confidentiality -- Key Distribution -- Random Number, Generation.

PART B

Introduction to Number Theory: (Basics Pertaining to Security Related Algorithms).

Public Key Cryptography: Principles --RSA Algorithm. Digital Signatures and Authentication Protocols -- Authentication Applications

Basic Overview of: Electronic Mail Security -- IP Security -- WEB Security
System Security: Intruders, Viruses and Worms -- Firewalls

Text Book:

1. Cryptography and Network Security, William Stallings. (Second Edition) Pearson Education Asia.

Reference:

1. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes-Ousley, Keith Strassberg Tata Mcgraw-Hill

ARTIFICIAL INTELLIGENCE (MT-202)

PART A

Introduction to AI

Roots and Scope of AI, Definition, Turing Test, Application Areas of AI

AI as Representation and Search

Predicate Calculus, Structures and Strategies for State Space Search, Heuristic Search

Control and Implementation of State Space Search

Representation and Inference

Knowledge Representation, Strong Methods for Problem Solving, Reasoning in Uncertain Situations

PART B

Machine Learning

Symbol-Based: Framework for Symbol – Based Learning, Version Space Search, ID3 Algorithm, Un-supervised learning, Reinforcement Learning

Connectionist: Perception Learning, Back propagation Learning, Competitive Learning, Hebbian, Coincidence Learning, Attractor Networks

Advanced Topics of AI Problem Solving

Automated Reasoning: Weak Methods in Theorem Proving, GPS and Difference Table, Resolution for Theorem Proving, Automated reasoning with PROLOG

Understanding Natural Language: Role of Knowledge, Symbolic Analysis, Syntax, ATN Parsers, Stochastic Tools for Language Analysis, Natural Language Applications

Text Book:

1. “Artificial Intelligence – Structures and Strategies for Complex Problem Solving”, George F. Luger, 4th Edition, Pearson Education , 2003.

E-COMMERCE

PART –A

Foundations of Electronic Commerce, Retailing in Electronic Commerce, Retailing in Electronic Commerce, Internet Consumers And Market Research, Advertisement in Electronic Commerce, Electronic Commerce for Service Industries, Business-Business Electronic Commerce

PART-B

Internet and Extranet, Electronic Payment Systems, EC Strategy and Implementation, Public Policy: From Legal Issues to Privacy, Infrastructure for EC, Economics, Global and Other Issues in EC, Software Agents

Text Book:

1. Electronic Commerce - A Managerial Perspective by Efraim Turban, Jae Lee, David King & H.Michael Chung, Pearson Education Asia (Low Price Edition)

EMBEDDED SYSTEMS

PART-A

Introduction to Embedded Systems: Embedded Systems overview, Examples of Embedded Systems, Microprocessors and Microcontrollers, The 8051 Architecture
8051 Assembly Language Programming, Interrupts, Embedded Software Architectures

PART-B

Introduction to Real-Time Operating Systems, Operating System Services, Basic Design Using a Real-Time Operating System ,Embedded Software Development Tools & Debugging techniques

TEXT BOOKS:

1. The 8051 Microcontroller, Architecture, Programming, & Applications, Kenneth J.Ayala, Penram International Publishing(India), Second Edition 1996

Data Warehouse & Mining (MT-301)

PART-A

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining,

Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, Online Data Storage.

Data Mining Primitives, Languages, and System Architectures: Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems,

PART-B

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
2. Data Mining Techniques – ARUN K PUJARI, University Press

3. Building the DataWarehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd..

REFERENCE BOOKS:

1. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.

2. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION

3. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION

4. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION

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